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FIXING ELEMENT FOR INSERTING INTO A
LONGITUDINAL CAVITY OF A CARRIER PLATE

RELATED APPLICATIONS

This application is a U.S. national phase application under 371 of PCT
5 Application No. PCT/EP02/14271 filed December 14, 2002, which claims priority of
German Application No. 101 64 441.8 filed December 29, 2001.

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

The invention relates to fixing elements consisting of plastic with a foot part
10 for insertion into an oblong hole of a carrier plate. The ~~,which~~ foot part consists of a
head corresponding to the edge of the oblong hole and of a shaft adapted to the width
of the oblong hole. The ~~,and which~~ fixing element can be locked in the oblong hole
after the insertion of the head by a quarter turn under elastic deformation of the shaft.
The shaft ~~consists of~~ includes a middle strut connecting the head to the fixing
15 element. The ~~,which~~ strut has the width of the oblong hole. A ~~and on each of the~~
~~two edges of which a~~ shank is formed on each of the two edges of the middle strut at
a right angle and in opposite directions in such a manner that they are elastically bent
towards the middle strut during the screwing in of the shaft through the edge of the
oblong hole and after a quarter turn they ~~rise back up again into~~ return to their
20 original position as a consequence of the elastic return force of the plastic and thus
~~oppose~~ prevent a rotation in the opposite direction.

2. DESCRIPTION OF RELATED ART

Such fixing elements are known from US-A-4,981,405. The ~~designing~~ design of the fixing ~~elements~~ element with two shanks formed on a shaft at a right angle and in opposite directions opposes a certain resistance to a turning of the fixing elements opposite the direction of screwing. The fixing element advantageously ~~that~~ reduces the risk of an unintentional loosening of the fixing element ~~elements in an advantageous manner.~~

Other fixing elements with formed-on shanks are known from US-A-4,375,879 and US-A-4,705,442.

10 DE 1 181 007 describes a fixing element of this type designed as a screw and nut in which the nut shaft that can be inserted into the oblong hole has a width corresponding to the width of the oblong hole and has stop faces running parallel to the screw axis. These stop faces work together with corresponding faces in the oblong hole so that a rotation of the nut is prevented when the screw is tightened.

15 This nut can be readily slackened back again after the screw has been loosened and then can be withdrawn through the oblong hole.

Furthermore, there are fixing elements with a foot part of the above-cited type comparable to the nut and provided with a similarly designed shaft. However, since this foot part is not screwed down, there is the danger that the fixing element can

20 become loose again by an unintended rotary movement.

~~The invention has the problem of indicating fixing elements of the type initially cited that are distinguished by an especially firm seat. One advantage of the present fixing element is that it is distinguished by an especially firm seat in the carrier plate.~~

5 ~~This problem is solved in accordance with the~~ The present invention is advantageous because it provides for a fixing element ~~of the type initially cited on the one hand in that the~~ with a head comprises having pressing ramps on its two outer ends that extend during screwing in over the edge of the oblong hole and ~~in that the other shanks are formed on the free ends of the shanks.~~

10 ~~This problem is solved on the other hand in accordance with the~~ The present invention is also advantageous because it provides for a fixing element ~~of the type initially cited in that the~~ having a head comprises with pressing ramps on its two outer ends that extend during screwing in over the edge of the oblong hole and ~~in that a~~ countershank ~~[[is]]~~ formed in the opposite direction on each of the two edges of the
15 middle strut.

The providing of the pressing ramps and of the other shanks and countershanks results in an especially firm seat since the fixing element is firmly connected to a carrier plate by the pressing ramps after rotation in the direction of screwing in. Also, and since an especially great resistance is ~~opposed~~ provided to
20 prevent to an undesired rotation of the fixing elements ~~in accordance with the~~

~~invention~~ counter to the direction of screwing in by the other shanks and countershanks.

~~Further advantageous embodiments of fixing elements of the invention are indicated in the dependent claims. Two special exemplary embodiments of fixing elements of the invention are explained in detail in the following with reference made to the figures in the drawings.~~

Other features and advantages of the present invention will be readily appreciated, as the same becomes better understood after reading the subsequent description taken in conjunction with the accompanying drawings.

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BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a side view of a fixing element with foot part for anchoring in an oblong hole ~~in a side view~~.

Figure 2 shows a section through the shaft with a view onto the head inserted in the oblong hole.

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Figure 3 shows the same section through the shaft during rotation.

Figure 4 shows the same section through the shaft after a completed quarter turn.

Figure 5 shows a sectional view of another fixing element with another shaft design for connecting two plates ~~in section~~.

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Figure 6 shows the ~~same~~ fixing element of Figure 5 in a side view.

Figure 7 shows a section through the shaft with a view onto the head inserted in the oblong hole.

Figure 8 shows the ~~same~~ section through the shaft of Figure 7 during the rotation.

5 Figure 9 shows the ~~same~~ section through the shaft of Figure 7 after a completed quarter turn.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The fixing element shown in Figures 1 to 4 consists of an upper part 1 for holding long structural components such as, e.g., cable bundles in a clamping manner.
10 The fixing element also includes a ~~and of~~ foot part 3 formed on its bottom plate 2 in a one-piece manner that is designed to be inserted into an oblong hole 4 of a carrier plate 20. Foot part 3 ~~comprises~~ includes a head 5 adapted in its outer contour to an edge 6 of the oblong hole. The ~~and~~ shaft 7 ~~with~~ has the same width as the oblong hole. Head 5 can be locked after having been inserted into oblong hole 4 by a quarter
15 turn under elastic deformation of shaft 7.

~~To this end~~ The head 5 ~~comprises~~ includes pressing ramps 8 on its two outer ends that slide during screwing in over edge 6 of the oblong hole onto the back side of the carrier plate. ~~Bottom~~ The bottom plate includes lowest support ribs 9. The
bottom plate 2 is slightly curved for this purpose and flexes upward to such an extent,
20 that during the pressing of the lowest support ribs 9 ~~that~~ causes the pressing ramps 8 ~~can~~ to slide under the carrier plate.

~~Shaft 7 consists according to the invention of~~ The shaft 7 includes a middle strut 10 connecting the head 5 to bottom plate 2. Shanks 12 are formed ~~[[in]]~~ at a right angle and in ~~opposing~~ opposite directions on the two edges 11 ~~in such a manner that they~~ of the middle strut 10. The shanks 12 are elastically bent toward the middle strut 10 during the screwing in of the shaft 7 through the edge 6 of the oblong hole (see Figures 3 and 8). After ~~and after~~ the quarter turn, the shanks 12 return to they ~~rise up again into~~ their original position as a consequence of the elastic return force of the plastic (see Figures 4 and 9). If The shaft 7 is to ~~cannot~~ be turned in the opposite direction, ~~this is impossible~~ without damaging the shaft 7, since shanks 12 cannot be pressed together and also cannot otherwise yield.

In addition, ~~in the exemplary embodiment according to Figures 1 and 4, the~~ fixing element includes two other shanks 13 ~~of the length of middle strut 10 are~~ formed on the free ends of the elastically deformable shanks 12, parallel to middle strut 10, and extending the length of the middle strut 10. These shanks have shoulders 14 ~~again running~~ extending in opposite directions on their free ends. The , ~~the length of which the~~ shoulders is equal to the ~~interval~~ distance between the middle strut 10 and shanks 13 ~~running~~ extending parallel to it. This assures that the shanks 12 are clamped in after a quarter turn V between middle strut 10 and edge 6 of oblong hole 4, and that elastically deformable shank 12 cannot yield laterally.

In ~~the exemplary~~ another embodiment according to Figures 5 and 6, a fixing element for connecting the two plates is shown with rotary handle ~~45~~ 115 and

resilient yielding support screen ~~46~~ 116 on whose bottom plate ~~47~~ 117 another shaft variant is formed. It should be appreciated that like features have like reference numerals increased by 100.

5 In this example, the shaft includes a countershank ~~48~~ is 118 formed in opposite directions on the free edges ~~44~~ 111 of the middle strut ~~40~~ 110. Interval "A" of both shanks ~~42~~ 112 and of countershanks ~~48~~ 118 corresponds to width "B" of oblong hole ~~4~~ and 104. Further, the countershank 48 118 is approximately twice as thick as the elastically deformable shank 42 112. In order to reinforce the supporting contact of the elastic shank ~~42~~ 112, a shoulder ~~49~~ 119 is also formed at a right angle
10 on its the free end, ~~just as in the case of the shank 112, similar to shanks 13 as~~ previously described in Figure 2.

The present invention has been described in an illustrative manner. It is to be understood that the terminology which has been used is intended to be in the nature of words of description rather than of limitation.

15 Many modifications and variations of the present invention are possible in light of the above teachings. Therefore, within the scope of the appended claims, the present invention may be practiced other than as specifically described.